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FIG. 1. PLAN.

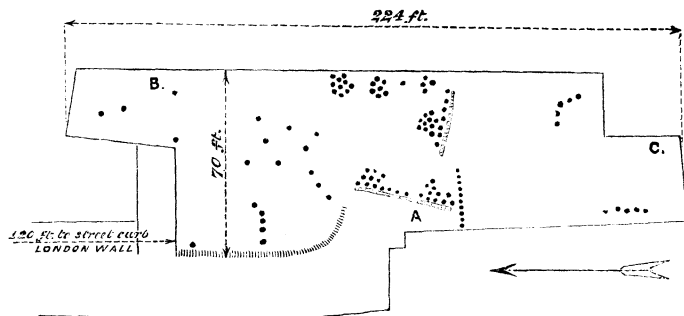


FIG. 2. SECTION at A.

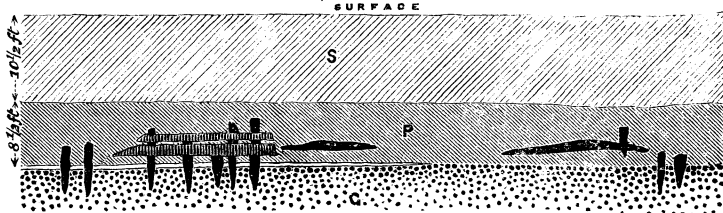


FIG. 3. SECTION at B.

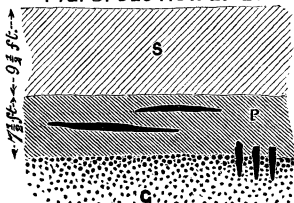


FIG. 4. SECTION at C.

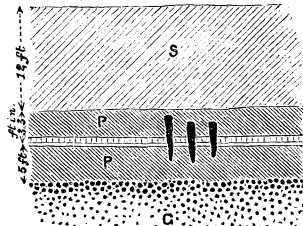


FIG. 5.

REDUCED  $\frac{2}{3}$  <sup>th</sup>



FIG. 6.

REDUCED  $\frac{4}{5}$  <sup>th</sup>



S-----SUPERFICIAL EARTH.

P-----PEAT.

G-----GRAVEL.

-----BLUE MUD, 6 in.

-----LIME DEPOSIT, 4 in.

-----KITCHEN MIDDENS.

|||-----PILES.

WW

A. LANE FOX DEL.

Seemann; T. Bendyshe, Esq.; Dr. R. S. Charnock; *Dr. J. Beddoe; Dr. Barnard Davis; C. Robert Des Ruffières, Esq. Director—Dr. James Hunt. Treasurer—*Rev. Dunbar I. Heath. *Ordinary Members—H. G. Atkinson, Esq.; C. Carter Blake, Esq.; W. Bollaert, Esq.; E. W. Brabrook, Esq.; J. Fred. Collingwood, Esq.; S. E. Collingwood, Esq.; J. W. Conrad Cox, Esq.; Dr. Langdon Down; Col. Lane Fox; Dr. George Gibb; J. Meyer Harris, Esq.; H. Hotze, Esq.; Dr. R. King; the Viscount Milton; Major S. R. I. Owen; Luke O. Pike, Esq.; Captain Bedford Pim, R.N.; W. Travers, Esq.; W. S. W. Vaux, Esq.; E. Villin, Esq.*

EDWIN H. BAVERSTOCK, Esq., F.R.S.L., proposed, and J. McGRIGOR ALLAN, Esq., seconded, that the thanks of the Society be given to the Scrutineers.

The proceedings were then concluded.

DECEMBER 18TH, 1866.

DR. CHARNOCK, V.P.A.S.L., IN THE CHAIR.

THE minutes of the previous meeting were read and confirmed.

The Fellows elected were announced as follows:—David Brodie, Esq., M.D., L.R.C.S.E., Larbert, Stirlingshire; F. Cooper, Esq., 131, Piccadilly, W.; J. Macgrigor Allan, Esq., 26, Park Street, Southampton Street, Camberwell, S.; Walter F. Dawson, Esq., 13, Old Quebec Street, Portman Square; W. Hunter Lyle, Esq., 41, Bath Street, Glasgow; Rev. H. F. Rivers, M.A., Loc. Sec. A.S.L., Sydney Villa, Luton, near Chatham; A. H. Pechell, Esq., B.A., Barton-on-Humber; W. J. Bustead, Esq., M.D., Zillah Surgeon, Chingleput.

*Corresponding Members.*—J. R. Logan, Esq., Penzance; George Catlin, Esq.

*Local Secretaries.*—Leopold Ferny, Esq., H.B.M. Consul at Puerto Rico; Robert Walters Moore, Esq., Adelaide, South Australia; Robert H. Collyer, Esq., M.D., 86, Rue de la Paix, Boulogne; W. Perkins, Esq., F.R.G.S., Gran Chaco, Buenos Ayres.

The following presents to the Library were announced:—

BOSANQUET. Chart of Early Jewish History.

R. WALKER. Ancient Shell Mounds at St. Andrews.

The following paper was read:—

*A Description of certain Piles found near London Wall and Southwark, possibly the Remains of Pile Buildings.* By Lieut.-Colonel AUGUSTUS LANE FOX, F.S.A., F.A.S.L.

My attention was first drawn to this locality by a short paragraph in the *Times*, of the 20th October, 1866, stating that upwards of twenty cartloads of bones had been dug out of the excavations which were being made for the foundations of a wool warehouse near London Wall.

Having visited the spot the same day, I found that the greater part of the area, a rough sketch of which is given in the accompanying plan,

fig. 1, had been already excavated to a depth of seventeen feet on the north side, and the remaining portion to a depth of from fourteen to sixteen feet.

The street which now goes by the name of the London Wall appears to occupy the site of that which originally ran along, and within the old city walls, vestiges of the wall and ditch having from time to time been discovered to the north of it.

The excavation in question commences at forty yards south of the street pavement, therefore in all probability at about seventy to eighty yards from the site of the old wall. The area excavated is of an irregular oblong form, sixty-one yards in length running north and south, and twenty-three yards wide, exclusive of the roadway down to the works, which is not yet excavated. A section of the soil is given in figs. 2, 3, and 4. It consists of

1. Gravel similar to Thames ballast at a depth of seventeen feet towards the north, inclining to twenty-two feet towards the south end.

2. Above this peat of unequal thickness varying from seven to nine feet.

3. Modern remains of London earth composed of the accumulated rubbish of the city.

When I first saw the place about two cart-loads of bones, nearly all broken and black from having laid in the peat, were heaped up in readiness to be carted away, and I was informed that several cart-loads had already been taken to the bone factory. Having secured a number of these as specimens, I showed them to Professor Owen, on whose authority I am enabled to say that they consist of the horse, or ass, the red deer, the wild boar, the wild goat (*Bouquetin*), the dog, the *Bos longifrons*, and the roebuck. The horns of the roebuck, I afterwards ascertained, were all found at a higher level. These, and also the horse and goat, entered the superficial earth, in which glazed pottery was also found; but the remainder, including the red deer, wild boar, and *Bos longifrons*, appeared, so far as my observations enabled me to judge, to be confined to the peat. All the bones retain their animal matter. No remains of any kind have, to my knowledge, been found in the subjacent gravel.

Upon looking over the ground my attention was at once attracted by a number of piles, the decayed tops of which appeared above the unexcavated portions of the peat, dotted here and there over the whole of the space cleared. I noted down the positions of all that were above ground at the time; and as the excavations continued, during the last two months, I have marked from time to time the positions of all the others as they became exposed to view; the result is shown in the accompanying plan.

Commencing on the south, a row of them ran north and south on the west side, to the right of these a curved row, as if forming part of a ring. Higher up and running obliquely across the ground was a row of piles, having a plank about an inch and a half thick and a foot broad, placed along the south face, as if binding the piles together. To the left of these another row of piles ran east and west; to the north-east again were several circular clusters of piles; these were not

in rings but grouped in clusters, and the piles were from eight to sixteen inches apart. To the left of this another row of piles and a plank two inches thick ran north and south. There were two other rows north of this and several detached piles, but no doubt several towards the north end had been removed before I arrived.

The piles averaged six to eight inches square; others of smaller size measured four inches by three; and one or two were as much as a foot square. They appeared to be roughly cut, as if with an axe, and pointed square; there was no trace of iron shoeing on any of them, nor was there any appearance of metal fastenings in its planks; they may have been tied to the piles, but if so, the binding material had decayed.\* The grain of the wood was still visible in some of them, and they appear to be of oak. The planks averaged from one to two inches thick. The points of the piles were inserted from one to two feet in the gravel, and were, for the most part, well preserved, but all the tops had rotted off at about two feet above the gravel, which I conclude must have been the surface of the ground, or of the water at the time these structures were in existence. Owing, no doubt, to similar causes, I was informed by the workmen that no superstructure of any kind was found here, a few Roman tiles from a foot to sixteen inches square, and an inch thick, were interspersed amongst the piles, but not in sufficient numbers to lead to the inference that the piles were surmounted by any platform of those materials; some of these had marks of fire on them. I only found two Roman bricks during the two months that I watched the excavations; and I therefore conclude that the superstructure, if any, must have been of wood or some other perishable materials, and that it must have rotted with the tops of the piles.

Amongst the articles of human workmanship found in the peat the vast majority are undoubtedly of the Roman era. Amongst them are quantities of broken red Samian pottery, mostly plain, but some of it depicting men and animals in relief, one specimen is stamped with the name of Macrinus. All this pottery, in the opinion of Mr. Franks, to whom I shewed it, is of foreign manufacture. Other samples are of the kind supposed to have been manufactured in the Upchurch Marshes in Kent, and upon the site of St. Paul's Church-yard. Bronze and copper pins, iron knives, iron and bronze stylus, tweezers, iron shears, a piece of polished metal mirror, so bright that you may see your face in it. This Dr. Percy has pronounced to be of iron pyrites, white sulphuret of iron without alloy, an iron double-edged hatchet, an iron implement, apparently for dressing leather, a piece of a bronze vessel, and other bronze and iron implements, which, thanks to the preserving properties of the peat, are all in excellent preservation. Amongst these were also a quantity of leather soles of shoes or sandals, some apparently much worn, and others, being thickly studded with hob nails, may be recognised as the caliga of the Roman legions; also

\* This applies chiefly to the south side. Towards the north I subsequently found a plank with several Roman nails in it; and the number of loose nails found in the soil above it, showed that they must probably have belonged to some wooden superstructure which had perished.

a piece of a tile with the letters P. PR. BR. stamped upon it. Specimens of these are on the table. The coins found are those of Nerva, Vespasian, Trajan, Adrian, and Antoninus Pius.

It is very remarkable that these Roman remains are interspersed at different levels from top to bottom throughout the peat, which, as I have already said, is from seven to nine feet thick, and in the opinion of all competent judges who have seen it, is, no doubt, of natural growth. This, as regards the heavier articles of bronze and iron, might be accounted for by supposing that they had sunk to the bottom of the soft peat, but the lighter articles, such as fragments of pottery, shoe soles, and kitchen middens of mussel and cockle shells, could never have found their way to the bottom in this way. There is, moreover, distinct evidence of the gradual increase of the peat in successive ages marked by kitchen middens obviously deposited upon the surface at separate periods, with intervals of peat between, shewing that it must have grown over the lower deposits before it received those lying above, and proving also that the ground must have been occupied during the whole time that the peat was in process of formation.

I have already stated that the greater part of the ground had been excavated before I saw it, and much valuable evidence must have been lost by this means, but the sides of the cutting shewed several admirable sections in which the history of upward growth of peat has been faithfully recorded, and I am happy to say that for the accuracy of these sections I have had the good fortune to secure two excellent witnesses in Mr. Carter Blake and the Rev. Dunbar I. Heath, both of whom I am happy to see present this evening. They have carefully examined the ground, and assisted in taking the measurements detailed in figs. 2 and 3.

Section A. Fig. 2 is at the south-west end of the cutting. At a foot and a half above the gravel in the peat is a layer of oyster and mussel shells about a foot thick, with a filtration of carbonate of lime permeating through the mass. In this kitchen midden, Roman pottery and a Roman caliga were found. Close by, the point of a pile, part of which is exhibited, was found upright in the peat; it had been driven in in such a manner that the point descends to the level of the kitchen midden and no further. Now, as a pile, in order to obtain a holding, must have been driven at least two feet in the ground, it is evident the peat must have grown at least one foot above the summit of the kitchen midden before this pile was driven in. Both Mr. Blake and the Rev. D. I. Heath can corroborate the accuracy of this fact. The points of most of the other piles were, as I have stated, a foot deep in the gravel; this pile must, therefore, have been driven in subsequently; by this means we fix the first stage in the growth of the peat.

Section B, Fig. 3, is at the north-east end. About one hundred feet from fig. 2 here, in a line sloping slightly to the south, at a height averaging three-and-a-half feet from the gravel, is a kitchen midden composed of oyster, cockle, and mussel shells, and periwinkles, with Roman pottery and bones of the goat and *Bos longifrons*, etc., split lengthwise as if to extract the marrow, with the skulls broken and the

horns cut off. It is about a foot and a half thick in the centre, thinning out towards the ends as a heap of refuse would naturally do, and from twelve to fourteen feet long ; above this is peat for about a foot or a foot and a half, and above the peat another kitchen midden of the same kind as the preceding.

Section c, Fig. 4, is at the south end. It consists of:—1, superficial earth, 12 feet ; 2, peat, 3 feet 3 inches ; 3, blue mud, 6 inches ; 4, a sediment of lime and gravel, which in some parts has agglutinated into a kind of hard concrete, 4 inches ; 5, peat, 5 feet ; and 6, gravel. The piles in this part had evidently been driven in at a time when the sediments of mud and lime formed the bottom of a piece of water, subsequent to the growth of the lower peat. A similar stratum of lime is seen in section 2, but here it lay between the peat and gravel. Owing to the building having been conducted in detached pieces, it is impossible to connect the two sections ; but as the stratum of lime is at different levels in figs. 2 and 4, it is probably not continuous.

Lastly, the soles of shoes and Roman pottery of the same kind as that found lower down have been taken out at the very top of the peat, so that the history of its growth may be read by the sections as follows :—

1. Oak piles driven into the gravel, the tops of which rotted off at the surface before the peat had grown more than two to three feet.
2. A kitchen midden deposited on peat a foot and a half thick during the Roman period. This may or may not have been contemporaneous with the first piles.
3. A growth of peat of one to two feet above this kitchen midden, and other piles then driven in.
4. A kitchen midden with *Bos longifrons* and Roman pottery at three-and-a-half feet.
5. Another growth of peat and another kitchen midden at six feet. And lastly, Roman remains at the very top. Trenches were also dug for the foundations in places where the gravel dipped as low as twenty-two feet from the surface, and still Roman pottery and other Roman remains were found everywhere in the peat.

It is certainly difficult, if not impossible, to reconcile this enormous rise of seven to nine feet peat during the four centuries of the Roman occupation with anything that has hitherto been conjectured respecting the growth of peat on the continent. Sir Charles Lyell, quoting Mons. Boucher de Perthes, gives the rate of increase at three centimetres in a century—this calculation would give little more than four inches for the period in question. It is true that he expressly states his belief that the increase is more rapid than this, and he moreover allows a large margin for the accelerated growth of loose spongy peat upon the surface ; it would also appear probable that in the damp climate of England the peat would grow much more rapidly than on the continent. In the moss of Hatfield, as well as that of Kincardine in Scotland, Roman roads, coins, and implements have been found covered to a depth of eight feet by peat,\* but this falls far short of the rate of increase that must have taken place in this spot during the Roman era.

\* Lyell's "Principles of Geology", p. 721.

With regard to the probability of this part of London having been a marsh at that time, it appears, by reference to the city sewers office, that the centre of the London Wall Street is 31.69 feet above the mean high water mark at London Bridge, taking the average level of the gravel in the excavation at nineteen-and-a-half feet below this, the bottom of the peat would be at twelve feet above high water mark. The extreme rise of the spring tide above mean high water mark during the year is seven feet, thus leaving a margin of five feet between the bottom of the peat and the highest spring tide water mark, as at present existing, considering, however, the great probability of the river having run at a higher level in Roman times, it appears not unlikely this spot may then either have been under water or exposed to inundations.

By information which I have received from the builder's foreman and others, it appears that throughout the whole tract of ground between this and the Thames similar remains of peat, piles, bones, and Roman pottery have been found. At the new Auction Mart north of the Bank piles have been found connected by camp-sheathings, as it is technically called by builders, that is, by planks joining them horizontally. At the Mansion House, and in the line of the old Wall Brook, piles, peat, and Roman pottery were discovered last year: this latter street takes its name from a brook which ran through this district from the old wall to the Thames. Had the piles been found in lines running uniformly east and west, it might very naturally be assumed that they were laid down for the construction of dams across this brook, but they are also found to run north and south. The circular clusters could never have been so arranged for the construction of dams or wharfs, but have all the appearance of having been driven in for the support of buildings, besides which the kitchen middens prove that habitations of some kind existed here. That they were occupied during the Roman period is also evident, but it does not necessarily follow that they were of Roman origin.

In addition to the Roman relics above-mentioned, others of ruder construction remain to be described. They consist of what, in the absence of any evidence respecting their uses may be called handles and points of bone. Figs. 5 and 6. The former are composed of the metacarpal bones of the red deer and *Bos longifrons* cut through in the middle and roughly squared at the small end; the others, which are called by the workmen spear-heads, are pointed at one end and hollowed out at the other, as if to receive a shaft. Both Professor Owen and Mr. Blake concur in thinking these implements *may* possibly have been formed with flint, but I cannot ascertain that they were found at a lower level than the Roman remains, nor have any flint implements, to my knowledge, been found in the place. With them were also found the two bone skates on the table; they are of the metacarpal bone of a small horse or ass, one of which has been much used on the ice. Exactly similar skates, also of the metacarpal of the horse or ass have been found in a tumulus of the stone period at Oosterend in Friesland, a drawing of them is given in Linden-submit's Catalogue of the Museum at Mayence, etc. Others have also



been found in Zeeland, at Utrecht, and in Guelderland, and there is a specimen in the Museum at Hanover. Professor Lindenschmit attributes all these to the stone period, but the specimens on the table are evidently of the iron age, the holes in the back having been formed for the insertion of an iron staple. Similar skates have been found in the Thames, but they have not hitherto been considered to date so early in England as in Roman times. Nearly all the animal bones found here, as also the skulls, have been split longitudinally, as if to extract the marrow and brain. Three specimens of skulls of the *Bons longifrons* are on the table all broken in the same place. Similar bones are found in nearly all lake dwellings.

On the east side the two human skulls now exhibited were found at the lowest depth of peat, viz., twenty-two feet, resting immediately upon the gravel, also three jaws, none of which belong to the skulls. One of these skulls is a remarkably fine one; the other quite the reverse, very small in the frontal region, large in the parietal and cerebellum, and somewhat pointed and low in the crown. Such a skull might very possibly have belonged to a savage, but no sound theory can be based upon it, as the Roman legion with its auxiliaries was such a heterogeneous body composed of different nations, that skulls of almost any description might be found amongst them. During the year 1862, when excavations for the adjoining building were being carried on, two other skulls were found near the same spot, but, with the exception of a shoulder-bone found in a different place, no other human bones were found in the excavations.

Mons. Troyon in his *Habitations Lacustres* observes that skulls are frequently found in the kitchen middens alone, without any other human bones, and he infers that this may be accounted for by the Gaulish practice of making trophies of the heads of their enemies; upon examining the contents of one of these skulls upon the table, which was broken at the base, I found amongst other things a mussel-shell, a cockle-shell, two or three stones of the plum or sloe, the shell of a hazel-nut, and a small piece of leather, showing that it must have been in contact with a refuse heap. The other skull, not broken, was filled with a brown silt.

Alluding to the possibility of British pile buildings being at some time discovered, Mons. Troyon draws attention to certain iron weapons found in the Thames resembling in pattern those of the bronze period found in the Swiss lakes, but he adds, "we must not, in the absence of other evidence, conclude from these implements alone that habitations upon piles have ever occupied the bed of the Thames." The only implement discovered at London Wall, which can with any probability be referred to the period of the iron age, is a kind of knife, which has all the appearance of having been the iron shoeing of some wooden implement, constructed with a view to economy of metal, and resembling by the slit at the back, in which the wood was inserted, some celts of the early iron period.

It is, however, very unlikely the Romans should have built their habitations on a marsh, but most probable the Britons may have done so. For, although no pile buildings have hitherto been discovered in

England, the Britons were surrounded on all sides by nations that built in the water. In Switzerland and in Franche Comté the Allobriges lived in lake dwellings during the iron age. In Iceland Crannoges, having the same human and animal remains that are found in this place, were in use so lately as the year 1603. In Scotland they were also used until comparatively recent times. The Britons, we know from Caesar, built their houses after the same fashion as the Gauls ; and of the fortifications of the Gauls, he says they were composed of timber mixed with layers of earth and piled into a rampart forty feet thick. We know that the Britons were familiar with the use of abatis for defensive purposes, and that they defended the passage of the Thames against the Romans by means of stakes planted in the river. Caesar says, that after passing the Thames (at Cowey) he found himself near the capital of Cassibelaunus, and that it was situated amidst woods and marshes. A town situated in the midst of marshes could have been built on nothing else but piles. He found the town extremely strong, both by art and nature, and vast numbers of cattle were found in the place.

Upon the whole, therefore, it appears not unlikely these piles may be the remains of the British capital of Cassibelaunus, situated in the marshes, and of necessity built on piles. From the abject state in which the Romans left them, and the very slight progress the Britons appear to have made on their own account, it is easy to understand how entirely dependent they must have been upon the Romans in everything. We may, therefore, naturally expect to find them using Roman tools, weapons, and pottery, possibly wearing their old shoes, but still living in their own primitive dwellings and inhabiting the same sites as when the Romans found them.

In conclusion, I have only to add that similar piles in every respect have within the last month been discovered in New Southwark Street. The piles are of the same scantling, also of oak, but somewhat longer than those at London wall ; the points are driven into the gravel ; the peat is three to four feet thick ; large beams of the same size as the piles have been laid across them horizontally, and Roman pottery is found at all depths in the peat. Judging from the extent over which these piles have been discovered, there can be little doubt that in digging for the foundations of the many very large warehouses and other buildings that are now being built within this district the remains of early habitations are constantly turning up and are destroyed without receiving attention.

From what has been already said in this paper it will be seen that if the evidence of pile buildings at London wall is inconclusive, it has arisen mainly from the large quantity of peat and its contents that had been carted away before the matter was made public. And, although I then endeavoured to enlist the interest of some of our leading authorities on the subject, hoping they might think it worthy of their attention, I cannot say that any great success attended my efforts until I was fortunate enough to meet with the two gentlemen before-named, who, I am happy to say, are present this evening, and from whose superior scientific attainments the society will derive much more

valuable information respecting the details of the several remains now exhibited than I am able to afford. Thus while the remotest parts of Europe are being searched for the vestiges of lake dwellings, and the most valuable reports on the same subject are received from the four quarters of the globe, similar remains are in daily process of destruction at our own doors by persons who are ignorant of their meaning, and of the importance that attaches to them. This certainly ought not to be. Matters of so much interest in connection with the prehistoric origin of our own capital, and at the same time serving so admirably to illustrate the conditions under which like structures have been erected elsewhere, are, I venture to think, well deserving of all the scientific knowledge and attention that can be brought to bear upon them.

Since the foregoing paper was read before the Society the excavations have been continued in making trenches for the concrete foundations towards the south end, and in cutting away the roadway upon the west side. As I was anxious to obtain some further evidence as to the thickness of the stratum in which the Roman remains are found, I determined to watch the workmen for four and five hours together during several successive days while they dug from top to bottom, commencing with the superficial earth and passing through the peat to the gravel below. The result of my observation is as follows:—Roman red Samian ware is found as high as 13 feet from the surface, but very rarely, and in small quantities. At 15 feet it is frequently found, and from that depth it increases in quantity till the gravel is reached at 18 to 21 feet. The chief region of Roman remains is within 2 to 3 feet of the gravel. We came upon the tops of the piles at 16 feet, they were jagged and rotten, shewing that they must have rotted off at that level. This was a point which I desired to have made clear by seeing the earth cut down from the surface until the piles were reached. The great quantities of shoe leather of all kinds found amongst the Roman remains, “caliga,” “solea,” “crepida,” together with two iron implements, apparently for dressing leather, suggests, at first sight, the question whether this spot may have been devoted especially to the manufacture of shoes; but the whole of the specimens obtained were fragments of worn or made shoes. I found no pieces of unformed leather, which would certainly have been the case had this been a quarter for shoemakers. In more recent times the surface has no doubt been occupied as a tannery, and the small passage within twenty yards of the excavations, which is still known by the name of “leather-sellers’ alley,” though it has long ceased to have especial connection with the sale of leather, must no doubt have been associated originally with this tan-yard, but the bottoms of the tan-pits are nowhere found at a greater depth than 8 feet from the surface; and there is no sufficient evidence to show that the particular designation of this locality in connection with the sale or preparation of leather could have had its origin in Roman times.

Portions of fifteen human skulls have been found exclusive of those before-mentioned as having been found on the adjoining premises some

time since, all resting on the gravel ; the highest, which I found myself, was 17 feet from the surface. Of these, eleven are of the type which is known as Roman, one very long one, decidedly of the "Celtic" type of Retzius, and one doubtful, the remainder are fragments.

With the skulls only three human bones have been found. That this was not the result of oversight is proved in three ways. Firstly, those skulls which I found myself had no human bones near them, and I examined all the refuse heaps ; secondly, all the workmen were on the look out for them, and I desired them to keep all they found for me ; thirdly, the bone contractor to whom the other bones were sold objected to receive human bones ; had any been found amongst the others they would have been thrown out, and, if I had not expressed a wish to have them, they would have been thrown into the cart and taken with the peat to the shoot ; so that nothing is more clearly proved than that the heads were severed from the bodies before they were thrown into the positions in which they were found.

There is only one further supposition which is for a moment worth considering, viz., whether the human bones may not have been broken and split up like those of other animals, in such a manner as to have escaped detection amongst the immense quantities of small fragments that were found in the kitchen-middens, together with oysters, cockles, and the human skulls. This, I think unlikely, as the joint ends would probably have been observed. It is true that all the skulls but three were broken, but the fragments were close by, so that I was able to restore ten of them. On the other hand, if the heads had been decapitated as trophies, and afterwards thrown away, it is curious that any human bones should have been found with them, and the question naturally arises, if a portion of the bones got amongst them, what became of the others ? Upon the whole, however, viewing the *pros* and *cons*, I see no good ground for the insinuation involved in this hypothesis. Both the Celts and the Romans are known to have practised decapitation, and it is evident the inhabitants of these pile buildings could have been in no want of animal food.

The piles at the south end have been identified as elm ; the remainder are oak (*Quercus Robur*).

Amongst the animal remains the excavations have brought to light a greater number of varieties than was at first supposed of the genus *Bos*. Mr. Carter Blake has identified no less than four different kinds ; viz., *primitivus*, *trochoceros*, *longifrons*, and *frontosus* ; these were all found together at a depth of 18 to 20 feet. Mr. Blake is preparing a detailed account of the fauna found in these excavations for the *Geological Magazine*.

The thanks of the Society were given to Col. Lane Fox for his interesting paper.

The Rev. DUNBAR HEATH, as one of the two witnesses referred to in the paper, confirmed the accuracy of the description of the excavations given by Col. Lane Fox. He said he saw one of the small piles pulled up, he saw the oyster beds, and the peat, and some of the things found imbedded in it. There were several points of interest which

arose from this remarkable discovery, but the only one on which he would make any observation was the suggestion that the name of London itself might be connected with these particular habitations. Mr. Heath considered it probable that if the habitations were built on a lake, this might have been the lake from which the name of Llyndin was derived.

The Rev. Dr. IRONS said that in an old book on the history of London by Douglas Campbell, the name was said to be derived from Welsh words signifying the city of the lake.

Mr. PIKE directed attention to the bone implements called in the paper, "skates." He thought one of them would be better defined as a sliding shoe than a skate, and it had evidently been much worn. The other, if an implement at all, was quite new, and had little appearance of being more than a bone.

Mr. CARTER BLAKE bore his testimony to the accuracy with which the investigations had been described, and to the care with which they had been made; and in those respects he contrasted what had been done by Col. Lane Fox with the exaggerated representations by Troyon and others of lake habitations on the Continent, where some authors had exhibited what Mr. Pike would term lamentable absence of "shame" in their accounts. Among the bones brought from the excavation at London Wall there were on the table numerous remains of *Bos longifrons*, which appears to have been coæval with Roman remains at those periods, but which does not now exist, although its descendants may survive in some breeds of the modern ox. There were other specimens which indicated the existence of a second species of extinct ox, the *Bos trochoceros*, found in the Swiss pfahlbauten. There was also a specimen, not of the ibex of the Alps, but of the more rare species of ibex of the Pyrenees, which was also found in some pleistocene caves. There was found also at a depth of seventeen feet from the surface, immediately above one of the kitchen middens, a fragment of a common snail shell (*Helix pomatia*) imbedded in the peat, retaining its colour, which was evidence against the extreme antiquity of the deposit. There were some metacarpal bones carved in a remarkable manner, with very curious marking, for some purpose which it was difficult to define. The markings were similar to those produced by flints, but there were no specimens of flint found in the peat in the London Wall excavation. Mr. Blake thought that the marks could not have been produced by anything but a flint implement, and that bronze or iron could never have produced them. The absence of flints, therefore, became very puzzling. He hoped the investigations would be continued, and by that means some further explanations might be obtained. He was sorry, indeed, that they came to the gravel so soon. The evidence the deposit afforded of the time required for the growth of peat was also important. The geologists who have had a great disposition to exaggerate the time of man's existence have taken the growth of peat as a factor. But the growth of peat was very uncertain evidence, for it depended much on the circumstance of its exposure to the weather. On one side of a hill a peat-bed was often shallow, and on the other side it was deep; the

rapidity of the growth having been affected by the windward or leeward side of the hill. That was a caution against accepting such factors in calculating the antiquity of man. Roman pottery was found at the same depth in the peat as the kitchen middens, and under whatever conditions the peat might have been formed they could not assign to it a period of greater antiquity than the Roman occupation of this country. Among the works of human industry found were female Roman *caligæ* which showed that the Romans were settled there at the time. The most important evidence discovered consisted of the two skulls on the table. One of the skulls accords with those described by Barnard Davis and others as Roman. The other accords with the low type of the Irish skull similar in character to those described by several authorities as characteristic of the river-bed Irishmen of Louth, Borris, Blackwater, and other places in the south of Ireland. He would not call it Celtic, as much difference of opinion exists as to what is the Celtic type, but it was dolichocephalic, and belonged probably to one of the Britons by whom the piles were made, and who co-existed with the Roman invaders.

The Rev. DUNBAR HEATH inquired whether there was any difference between the animal remains found at London wall and those found elsewhere.

Mr. CARTER BLAKE said it was a very curious fact that in these remains they had a true cave species of goat (*Capra pyrenaica*) associated with human bones and Roman manufactures. But palæontology, like anthropology, was in its infancy, and he should be sorry to draw any conclusion from such an association; the fact, however, was unparalleled.

Major OWEN asked whether the specimen of the bone of the goat was found in the gravel?

Mr. CARTER BLAKE replied that nothing was found in the gravel. Similar specimens had been found in a cave in Somersetshire.

Mr. CHARLESWORTH said he had paid much attention to the mammalian remains in the drift and to those of the pliocene period, yet he had no knowledge of the species of goat of which the specimen was exhibited, having been found in those deposits. With respect to the association of the bones of extinct animals with human remains, he did not consider that it proved they were contemporaneous. The Romans or Britons might have stumbled on a fossil-bone and fashioned it into an implement, for which purpose it would serve as well or better than recent bones. It did not follow, therefore, because they were found together that they must necessarily have existed at the same time. One of the subjects in which he had taken special interest was the association of the remains of extinct and recent animals in the stratum, and he had frequently opposed the theory propounded by Sir Charles Lyell, that the relative ages of different strata might be determined by counting the percentage of recent and extinct animal remains, and thus ascertaining the chronological sequence. One great oversight he (Sir C. Lyell) committed was the omission to take into consideration that geological formations are made up from the wrecks of older formations, and thus there are

mingled together the fossil remains of different periods. That view he believed is now fully recognised, and it might be made to bear on that discussion. With respect to the fossil bones of an ass spoken of by Col. Fox, he was not aware that there is any difference osteologically between the bones of an ass and of a small horse, and he thought they were not to be distinguished in a fossil state.

Mr. CARTER BLAKE stated that there were clear proofs of a distinct osteological difference between the ass and the horse. There was a difference in the teeth, in the long bones in the skull, and in other particulars. There is a difference also in the texture of the bones, which on microscopical examination can be immediately detected.

Col. LANE FOX said there was a gouge found in the peat, made from a bone that was evidently older than the other bones.

Dr. CHARNOCK made some observations in answer to the remarks of the Rev. Dunbar Heath on the etymology of the name London, and the other Celtic names mentioned by him. The Welsh, *lli*, signifying a flood, flux, stream (found inverted in local names commencing with *al*, *el*, *il*, *ol*, *hul*), was liable to take the form of *lag*, *leg*, *lug*, *lid*, *lud*, *lon*, *lun*, *lyn*; hence Londinium, Lundinium, Lyndin, or London, which was precisely the same as Leyden in Holland, and Lyon in France, both of which were anciently written Lug-dunum. He thought London did not derive its name from its situation upon the Thames, but from some stream, perhaps the Fleet Ditch (which may have been anciently called the Lug, Lud, Lun, Lon), which flowed into it, and that the name London could mean none other than a "fortress or town on the water" (*lyn-din*, *lun-din*, *lan-dun*.)

The Rev. DUNBAR HEATH then read the following paper:—

*On the way in which large bodies of Mute Men would acquire language from small bodies of Speaking Men.* By the Rev. DUNBAR I. HEATH, M.A., Treas. A.S.L.

The distinction generally presupposed or stated as distinguishing mutes from speaking beings, is that the latter use distinct articulation while the former use only vowel cries or inarticulate sounds, as dogs and cats do, in expressing what they have to express. A little consideration, however, will show, that the character of the sounds produced, whether clear or confused, distinguished and articulate, or indistinguishable and inarticulate, has nothing at all to do with what we really mean by the power of speech or language. It will be easily seen that large numbers of the sounds habitually made in what is usually called speech by speaking men are the same as those made by dumb brutes, and large numbers of the sounds made by dumb brutes occur repeatedly in what are called the languages of mankind.

It would also be trivial to build up so fundamental a distinction as that between mutes and speakers on so unimportant a peculiarity as the mere sorts of sounds, or other signs, made use of. For the ground of such a distinction we must seek a peculiarity in some more advanced part of human nature than man's throat and chest, or even that lower emotional nature which he shares largely with beings beneath him.

The real distinction then between mutes and speakers will, I think,